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EXAMINER	
DANIELS, ANTHONY J	
ART UNIT	**PAPER NUMBER**
2615	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/083,146	EJIMA, SATOSHI	
	Examiner	Art Unit	
	Anthony J. Daniels	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 2/27/02

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) *22-25* is/are allowed.

6)☒ Claim(s) *1-6,8-13,15 and 17-21* is/are rejected.

7)☒ Claim(s) *7,14 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Digital Camera and Digital Processing System for Correcting Motion Blur Using Spatial Frequency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1,10,11,20 are rejected under 35 U.S.C. 102(e) as being anticipated by Sugahara et al. (US # 6,778,210).

As to claim **1**, Sugahara et al. teaches a digital camera (see image pick-up apparatus in Figure 1) comprising: an image-capturing device that captures a subject image (see Figure 1, CCD "5"); an exposure control mechanism (see Figure 1, system controller "12") that

implements control on a length of exposure time to elapse while capturing the subject image at said image-capturing device (see Col. 4, Lines 61-66); an image generating device (see Figure 1, system controller "12") that generates a plurality of sets of image data through successive image-capturing operations performed over varying exposure times by controlling said image-capturing device and said exposure control device (see Col. 4, Lines 61-66); and an image processing device (see Figure 1, pickup image generating section "8-3") that generates image data in which the blur has been corrected by implementing image processing based upon the plurality of sets of image data generated by said image generating device (see Col. 5, Lines 16-18).

As to claim **10**, Sugahara et al. teaches a digital camera according to claim 1, further comprising: a flash control device (see Figure 1, exposure control driver "17") that controls a flash light (see Figure 1, strobe "15") emitting unit to illuminate a subject at light emission quantities in proportion to varying exposure times when generating a plurality of sets of image data over the varying exposure times at said image generating device (*It is inherent in exposure control that light is emitted in proportion to the exposure time.*).

As to claim **11**, Sugahara teaches a digital camera according to claim 1, further comprising: a blur detection device that detects a blur manifesting in image data based upon a plurality of sets of image data generated at said image generating device (see Figure 1, image blur detecting section "8-1"; Abstract, Lines 12-14), wherein: said image processing device records one set of image data among said plurality of sets of image data into a recording medium (see Figure 1, memory card "10"; *{Note the connection in the block diagram of Figure 1 between the digital process circuit (8) and the memory card interface (9).}*) without implementing image processing for blur correction if the detection results obtained at said blur detection device

indicate that none of the plurality of sets of image data manifest a blur (see Col. 5, Lines 14,15; "...when an image blur has been detected;"), and executes image processing for blur correction if a blur has occurred in one of the plurality of sets of image data and records image data obtained by correcting the blur into the recording medium (see Figure 1, memory card "10"; Col. 5, Lines 14,15; "...when an image blur has been detected;").

As to claim **20**, Sugahara et al. teaches a digital camera according to claim 1, further comprising: a detection unit that detects a photographing condition of said digital camera which manifests a blur in image data generated by said image generating device (see Figure 1, image blur detecting section "8-1"), wherein: said image processing device executes image processing for blur correction only when said detection unit detects the photographing condition of said digital camera which manifests a blur in the image data (see Col. 5, Lines 14,15, "...when an image blur has been detected;").

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 2,5,12,21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (see Patent Number above) in view of Horiuchi et al. (US # 6,037,972).

As to claim **2**, Sugahara et al. teaches a digital camera according to claim 1, wherein: said image generating device successively generates first image data by capturing an image over a first exposure time and second image data by capturing an image over a second exposure time set longer than the first exposure time (see Col. 3, Lines 29-36; *{A plurality of images are taken and the exposures differ between images; it is inherent that the exposure time of one image will be longer than the exposure time of another image.}*); and said image processing device generates third image data in which the blur has been corrected (see Col. 5, Lines 14,15). The claim differs from Sugahara et al. in that it further requires that the blur be corrected by correcting at least a high-frequency component of a spatial frequency contained in the second image data based upon the first image data and the second image data generated by said image generating device.

In the same field of endeavor, Horiuchi et al. teaches blur detecting/correcting based on a high-frequency video signal coming from a solid-state image pickup element (see Col. 3, Lines 40-43). In light of the teaching of Horiuchi et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of blur detection/correction of Horiuchi et al. in the blur correcting sections of the system of Sugahara et al, because an artisan of ordinary skill in the art would have recognized that this type of blur detection/correction can also automatically focus the camera; thereby, making the operation of the camera more efficient.

As to claim **5**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera according to claim 2, further comprising: a display control device (see Sugahara et al., Figure 1, digital process circuit "8"; *{Note the connection between the digital process circuit (8) and the LCD (11) in Figure 1.}*) that allows the second image data to be displayed at a display unit (see

Sugahara et al., LCD "11"; Col. 4, Lines 66,67, Col. 5, Lines 1-4) and disallows display of the first image data at the display unit (*It is inherent that when one of a plurality of image data is displayed on an LCD or something of the sort, another of the plurality of image data is not allowed for display.*).

As to claim **12**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera according to claim 2 further comprising: a blur detection device (see Sugahara et al., Figure 1, image blur detecting section "8-1") that detects a blur manifesting in the second image data based upon the first image data and the second image data generated at said image generating device (see Sugahara et al., Abstract, Lines 12-14), wherein: said image processing device records the second image data into a recording medium (see Sugahara et al., Figure 1, memory card "10") without implementing image processing for blur correction obtained at said blur detection device indicate that the second image data do not manifest any blur (see Sugahara et al., Col. 5, Lines 14,15, "...when an image blur has been detected;"), and executes image processing for blur correction if a blur has manifested in the second image data (see Sugahara et al., Col. 5, Lines 14,15, "...when an image blur has been detected;") and records third image data obtained by correcting the blur into the recording medium (see Sugahara et al., Figure 1, memory card "10").

As to claim **21**, Sugahara et al. teaches an image processing system (see Figure 1) comprising: a digital camera (see Figure 1) having an image-capturing device that captures a subject image (see Figure 1, CCD "5"), an exposure control device (see Figure 1, system controller "12") that controls the length of exposure time to elapse while capturing the subject image at said image-capturing device (see Col. 4, Lines 61-66) and an image generating device

(see Figure 1, system controller "12") that engages said exposure control device and said image-capturing device to successively generate first image data by capturing an image over a first exposure time and second image data by capturing an image over a second exposure time (see Col. 4, Lines 61-66) set longer than the first exposure time (see Col. 3, Lines 29-36; *{A plurality of images are taken and the exposures differ between images; it is inherent that the exposure time of one image will be longer than the exposure time of another image.}*). The claim differs from Sugahara et al. in that it further requires that the image processing apparatus generates third image data by correcting at least a high-frequency component of a spatial frequency contained in the second image data based upon the first image data and the second image data generated by said digital camera.

In the same field of endeavor, Horiuchi et al. teaches blur detecting/correcting based on a high-frequency video signal coming from a solid-state image pickup element (see Col. 3, Lines 40-43). In light of the teaching of Horiuchi et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the method of blur detection/correction of Horiuchi et al. in the blur correcting sections of the system of Sugahara et al, because an artisan of ordinary skill in the art would have recognized that this type of blur detection/correction can also automatically focus the camera; thereby, making the operation of the camera more efficient.

4. Claims 3,17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (see Patent Number above) in view of Horiuchi et al. (see Patent Number above) and further in view of Konishi et al. (US # 5,420,635).

As to claim **3**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera according to claim 2. The claim differs from Sugahara et al., as modified by Horiuchi et al., in that it further requires that said exposure control device implements control so that the second exposure time is set to a length of time over which a correct exposure quantity that sets brightness of the image data to a correct level is achieved and so that the first exposure time is set equal to or less than approximately ½ of the second exposure time. *The language "so that the second exposure time is set to a length of time over which a correct exposure quantity that sets brightness of the image data to a correct level is achieved" is an advantage of the limitation of the claim; it is not a limitation of the claim.*

In the same field of endeavor, Konishi et al. teaches a first exposure time at one-half to one-fourth the exposure time of a second exposure time in a motion (blur) detection system (see Col. 29, Lines 38-46). In light of the teaching of Konishi et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to set the exposure times of Konishi et al. as the exposure times of Sugahara et al., as modified by Horiuchi et al., because an artisan of ordinary skill in the art would recognize that taking images of a long exposure time would allow for motion blur to occur, and taking images of short exposure times (1/2 – ¼ of the long exposure time) would allow for high luminance areas to be captured without movement occurring (see Konishi et al., Col. 29, Lines 40-43), thereby creating a true motion blur model through which motion blur can be effectively suppressed; furthermore, it allows for an increase in dynamic range at the low end.

As to claim **17**, the limitations of claim 17 can be found in claim 3. Therefore, claim 17 is analyzed and rejected as previously discussed with respect to claim 3.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (see Patent Number above) in view of Horiuchi et al. (see Patent Number above) in view of Yamasaki et al. (US 20020044772) and further in view of Konishi et al. (see Patent Number above).

As to claim **6**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera according to claim 2. The claim differs from Sugahara et al., as modified by Horiuchi et al., in that it further requires that said image processing device generates the third image data by correcting an amplitude and a phase of a spatial frequency component of the second image data based upon an amplitude ratio and a phase difference of the spatial frequency component of the first image data and the spatial frequency component of the second image data.

In the same field of endeavor, Yamasaki et al. teaches blur detecting and focus correcting phase difference detecting method (see [0119]). In light of the teaching of Yamasaki et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the phase difference detection type of Yamasaki et al. in the digital process circuit of Sugahara et al., because an artisan of ordinary skill in the art would recognize that the blur detecting method of Yamasaki et al. could also be used to focus the camera of Sugahara et al., as modified by Horiuchi et al.

Further in the same field of endeavor, Konishi et al. teaches amplitude correction by multiplying the images in frame memory with an amplitude ratio of first and second image data (see Figure 9, Col. 22, Lines 36-39; Col. 23, Lines 9-12); *{The image data of the frame memory (21,22) in Figure 9 are the first and second image data.}*). In light of the teaching of Konishi et

al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the digital process circuit of Sugahara et al. the correction of the amplitude of the image data of Sugahara et al. using the weighted average of Konishi et al., because one of ordinary skill in the art would recognize that such a correction would provide the corrected image with not only a blur-free appearance, but also with a wider dynamic range.

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (see Patent Number above) in view of Horiuchi et al. (see Patent Number above) and further in view of Allen et al. (US # 5,430,480).

As to claim **4**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera according to claim 2, further comprising: a recording device that records the first image data and the second image data (see Figure 1, memory card "10"). The claim differs from Sugahara et al. in that it further requires that an image compression device compresses first image data at a first compression rate and compresses second image data at a second compression rate higher than the first compression rate, and the recording device records the compressed images.

In the same field of endeavor, Allen et al. teaches the compression of two image data frames (see Col. 4, Lines 37,38) and teaches a higher compression rate of simpler images (i.e. images with low frequency detail) (see Col. 1, Lines 55-58; *{On page 22, Lines 22-25 of the specification, applicant shows that an image with less high frequency detail is compressed at a higher rate.}*). It would have been obvious to one of ordinary skill in the art at the time the invention was made to compress the image data of Sugahara et al., as modified by Horiuchi et al., with low frequency at a higher rate than the image data of Sugahara et al., as modified by

Horiuchi et al., with higher frequency detail, because an artisan of ordinary skill in the art would recognize that compressing the data as much as possible will save the most space in memory.

7. Claims 8,9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (see Patent Number above) in view of Horiuchi et al. (see Patent Number above) and further in view of Tamura et al. (US 6,040,860).

As to claim **8**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera of claim 2. The claim differs from Sugahara et al. in that it further requires that said image processing device implements gradation correction processing on the third image data if the third image data that have been generated contain brightness data indicating a value equal to or higher than a predetermined value.

In the same field of endeavor, Tamura et al. teaches comparing an image signal with a reference value and from this determining a degree of gradation which needs to be applied (see Col. 5, Lines 50-67, Col. 6, Lines 1-3). In light of the teaching of Tamura et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply gradation correction to the image of Sugahara et al., because an artisan of ordinary skill in the art would have recognized that the imaging apparatus could output an image with rich gradation across the entire gradation range without gradation loss or conspicuous noise from subjects imaged in a lighting condition ranging from backlit to normal lighting (see Tamura et al., Col. 6, Lines 38-42).

As to claim **9**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera according to claim 2. The claim differs from Sugahara et al., as modified by Horiuchi et al., in

that it further requires that said image processing device implements processing the third image data to increase a quantifying bit number thereof if the third image data having been quantized at a predetermined quantifying bit number contain brightness data indicating a value equal to or higher than a predetermined value.

In the same field of endeavor, Tamura et al. teaches different quantized data for difference types of pixel information (see Col. 10, Lines 63-67; Col. 1, Lines 1-5) which are separated by threshold values (see Figure 4). In light of the teaching of Tamura et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to give different quantized values to groups of pixel data separated by a threshold value in the image data values of Sugahara et al., as modified by Horiuchi et al., because an artisan of ordinary skill in the art would recognize that this would prevent pixels with different analog values from having the same digital value.

9. Claims 13,15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (see Patent Number above) in view of Horiuchi et al. (see Patent Number above) and further in view of Mathew et al. (US # 6,628,711).

As to claim **13**, Sugahara et al., as modified by Horiuchi et al., teaches a digital camera according to claim 9. The claim differs from Sugahara et al., as modified by Horiuchi et al., in that it further requires a panning direction setting unit through which a panning direction along which the second image data are captured is set, wherein: said image processing device changes details of image processing implemented to generate the third image data in correspondence to the panning direction set at said panning direction setting unit.

In the same field of endeavor, Mathew et al. teaches a motion vector map which determines the motion of the camera due to panning (see Col. 3, Lines 33-37) and compensates for such (see Figure 1, jitter estimation unit "14"; Col. 3, Lines 43-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the jitter estimation means to compensate for the effect of panning in the system of Sugahara et al., as modified by Horiuchi et al., because one ordinary skill in the art would recognize that eliminating the effects of panning would allow a user to obtain motion blur-free dynamic images.

As to claim **15**, the limitations of claim 15 can be found in claim 13. Therefore, claim 15 is analyzed and rejected as previously discussed with respect to claim 13.

10. Claims 18,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugahara et al. (see Patent Number above) in view of Horiuchi et al. (see Patent Number above) in view of Mathew et al. (see Patent Number above) and further in view of Konishi et al. (see Patent Number above).

As to claim **18**, Sugahara et al., as modified by Horiuchi et al. and Mathew et al., teach a digital camera according to claim 13. The claim differs from Sugahara et al., as modified by Horiuchi et al. and Mathew et al., in that it further requires said exposure control device implements control so that the second exposure time is set to a length of time over which a correct exposure quantity that sets brightness of the image data to a correct level is achieved and so that the first exposure time is set equal to or less than approximately ½ of the second exposure time.

In the same field of endeavor, Konishi et al. teaches a first exposure time at one-half to one-fourth the exposure time of a second exposure time in a motion (blur) detection system (see Col. 29, Lines 38-46). In light of the teaching of Konishi et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to set the exposure times of Konishi et al. as the exposure times of Sugahara et al., as modified by Horiuchi et al. and Mathew et al., because an artisan of ordinary skill in the art would recognize that taking images of a long exposure time would allow for motion blur to occur and be corrected, as well as increase the dynamic range at the low end, and taking images of short exposure times (1/2 – 1/4 of the long exposure time) would allow for high luminance areas to be captured without movement occurring (see Konishi et al., Col. 29, Lines 40-43).

As to claim **19**, the limitations of claim 19 can be found in claim 18. Therefore, claim 19 is analyzed and rejected as previously discussed with respect to claim 18.

Allowable Subject Matter

11. Claims 7,14,16 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: As to claim **7**, the prior art does not teach or fairly suggest generation of image data based upon an ***average*** phase difference of first and second image data. As to claim **14,16**, the prior art does not teach or fairly suggest the correction of a image data primarily by correcting a spatial frequency component along a vertical direction contained in the second image data if horizontal panning is set at said

panning direction setting unit, and generates the third image data primarily by correcting a spatial frequency component along the horizontal direction contained in the second image data if vertical panning is set at said panning direction setting unit.

12. Claims 22-25 are allowable.

The following is an examiner's statement of reasons for allowance: As to claim **22**, the prior art does not teach or fairly suggest detection of a panning direction along which image data has been captured. As to claim **23**,**24**, the prior art does not teach or fairly suggest generation of image data based upon an ***average*** phase difference of first and second image data. As to claim **25**, the prior art does not teach or fairly suggest detection of a panning direction along which image data has been captured, nor the correction of a image data primarily by correcting a spatial frequency component along a vertical direction contained in the second image data if horizontal panning is set at said panning direction setting unit, and generates the third image data primarily by correcting a spatial frequency component along the horizontal direction contained in the second image data if vertical panning is detected by said panning direction setting unit.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Daniels whose telephone number is (703) 305-4807. The examiner can normally be reached on 8:00 A.M. - 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thai Tran can be reached on (703) 305-4725. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AD
1/24/2005

NGOC-YEN VU
PRIMARY EXAMINER